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JK Lamb / K-25 1034A
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Date of request 6/22/95 Expected receipt of document 7/15/95

Document number A-4707 Date of document 6/25/47

Title and author (if document is unnumbered)

(This section to be completed by Document Center)

Date request received 6/27/95

Date submitted to ADC 6/30/95

Date submitted to HSA Coordinator 6/27/95

(This section to be completed by HSA Coordinator)

Date submitted to CICO 6/30/95 7/20/95

Date received from CICO 7/20/95

Date submitted to ChemRisk/Shonka and DOE 7-27-95

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received

Signature

K/EM-171

SANITIZED VERSION OF PROGRESS REPORT ON URANIUM CONTROL AT K-25 FOR MAY 1947

(Sanitized Version of CRD Document # A-4707, dated 6/25/47))

Compiled by
S. G. Thornton
Environmental Management Division
OAK RIDGE K-25 SITE
for the Health Studies Agreement

July 1995

Oak Ridge K-25 Site
Oak Ridge, Tennessee 37831-7314
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the U.S. DEPARTMENT OF ENERGY
under Contract DE-AC05-84OR21400

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Approved for issue by: R. W. Levin
Date of issue: June 25, 1947

This document consists of 5 pages. w/ attach
No. 6 of 19 copies, Series A

Report No: A-4707

AEC RESEARCH AND DEVELOPMENT REPORT

CARBIDE AND CARBON CHEMICALS CORPORATION

URANIUM CONTROL AND INSPECTION DEPARTMENT

PROGRESS REPORT ON URANIUM CONTROL AT K-25

FOR MAY, 1947

G. T. E. Sheldon
R. W. Levin

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CARBIDE AND CARBON CHEMICALS CORPORATION
URANIUM CONTROL AND INSPECTION DEPARTMENT

TO: S. C. Barnett DATE: June 23, 1947

PROGRESS REPORT ON URANIUM CONTROL AT K-25

FOR MAY, 1947

ACCOUNTABILITY SECTION - A. de la GARZA

Samples taken from the normal feed and cascade waste continue to be taken on a routine basis. Analysis of the data resulting from this routine sampling gave the first reliable precisions of cascade feed and waste chemical purities. Target values for the precisions of the chemical purities of these two streams are now being met.

A test was made to measure the sampling precision of a shaken liquid waste drum. Good X-homogeneity was indicated; the sampling precision being less than 0.12% of the waste assay.

A test was conducted to find whether cascade waste could be sampled for X-assay determination by taking an 8-aliquot sample on the drain line for each waste drum. If this sampling method were satisfactory, shaking of liquid waste drums could be eliminated. The data is under study; a report will be issued.

The X-composites formed from Harshaw cells taken from shaken liquid waste and PDF drums were prepared for approximately the last two weeks of the month of April. Results appear to be satisfactory; the laboratory reported a precision of better than 0.1% for the ratio of feed to waste and about 0.1% for the ratio of feed to PDF. This method of compositing has been continued during May.

A test is being conducted to determine building datum drift. A report will be issued.

A test was conducted to determine whether small building datum pressure changes are reflected as small building inventory changes. The test shows that datum pressure changes as small as 0.005 psi are reflected in motor load changes,

and consequently, as inventory changes. A report is to be issued. This test definitely indicates that the cascade inventory is sensitive to small pressure variations, and therefore, good knowledge of datum stability or datum pressure is needed.

The program to obtain precise pressure readings at inventory time continued. Good pressure readings are now being reported. Emphasis on the subject will continue.

For the present, the system designed to check the cascade balance at frequent intervals will be discontinued. The system was not sufficiently flexible to follow cascade inventory changes, in particular, those changes due to gradient changes. This system did serve the purpose of being an independent check on the calculations for the official cascade balance.

A cascade inventory was taken on May 19. The purpose of this inventory was to check the April 30 inventory.

Table I gives the sources of uncertainty in the X-balance with the current limit of error and contributing yearly variance for each source. At present, it is indicated that stream biases are the largest contributing factors in stream measurements. However, this does not reflect itself in poor monthly balance precision. The largest contributor to poor monthly balance precision is the datum system variability.

Besides the sources of uncertainty given in Table I, there are miscellaneous operations that affect the cascade balance. Among these are cold trapping, sampling, and carbon trap removals. Although these operations deal with relatively small quantities, it is believed that they are subject to poor control and to large gross errors. These activities deal mainly with low assay material and therefore, the X-balance is not affected to a great extent; however, these activities probably affect the T-balance to a considerable extent. An effort is to be made to follow these activities more closely.

General

Routine quality control on stream weights continues. Monthly reports are to be issued.

The material accountability report for the month of April, 1947 was issued. Individual balances on Contaminated Storage and Engineering Development Areas were issued for the first time. In addition, a plant inventory break-down by assay ranges, material types, and balance areas was given.

CONSUMPTION SECTION - C. P. COUGHLEN

I. Dust Filter in K-311-1

A report, Plant Dust Filter, No. A-4183, 1.73.21, by D. H. Stewart, and C. P. Coughlen, was issued on the results of a plant dust filter installed in the tails stream of K-311-1. It was concluded that there is ambient dust in the tails stream.

II. Stripping of Converters

A. B-82X was stripped April 24, 1947, and during the course of the run the converter apparently "burned". An attempt was made to keep C-216 up during the trapping. A total of 1,043 grams was trapped, and only 554 grams was transferable. An analysis of the trap showed 280.0 grams of T metal, 94.7% in TO_2F_2; this together with the 17.5 grams of T dust found in the converter showed B-82X to have the highest consumption yet found. An accident to laboratory personnel from the trapped contents of B-82X is being investigated.

B. The buildup of stripped converter B-168 is complete, showing a rate of 560 md.

C. Converters A10, A27, A15, were successfully stripped, and are awaiting lab results for completion.

D. Converter A-35 burned and as the C-216 disappeared no results are salvageable.

III.

IV. Converter Test

Several of the first cans have been removed and are in the laboratory for analysis.

V. Meeting with Process and Engineering Development Personnel

A preliminary meeting with Process and Engineering Development personnel was held on May 27, to discuss the proposals in two reports, A-4173 and A-4175 by J. Kelly and it was recommended that the U-235 consumption for use in material balances be obtained by cell testing, and that programs for stripping T from converters to determine current consumption be discontinued.

DIVERSION CONTROL - N. H. VAN WIE

Effective June 1 Mr. N. H. Van Wie will transfer to Engineering Development Division and Mr. F. Strang will coordinate activities concerning diversion control.

1300 Area

A system of visitor control was established in this area on May 27. Two degrees of control was practiced, depending upon the concentration and amount of uranium compounds being processed. When processing material of Class A, B, or C visitors will record on a register their name, badge number, time of entry, and destination. Their retention of the red Carbide photo badge indicates their status as visitors, as the employees working forty hours per week within the area are provided, at the gate, with exchange photo badges having a yellow background. When appreciable quantities of class D material or above are being processed, the visitor will be detained at the gate until an escort is provided by the operating group. The visitor will remain under surveillance during his entire stay within the area.

Alterations to make the material storage room and the oxide conversion room more secure are complete.

Plant II

Work orders have been placed for the various improvements in "man-tight" controls as outlined in the April progress report, but action has been delayed on these pending approval of additional diversion control funds.

K-305-9 change house is now being used as the entrance to the RR Area.

CODED CHEMICALS SECTION - F. H. ANDERSON

Since early in December, this section has made an intensive effort to reorganize the system for uranium accounting, so that no uncertainty would be contributed to the Plant Material balance from accounting errors. During the month of May, much progress was made in the completion of back work, with the result that the accounting section is now essentially current on the points considered. While numerous problems are unsolved at this writing, and much remains to be done before the system is developed completely, improvement from this time may be made with knowledge that a firm foundation on which to build exists.

Accounting Unit

The portion of the April material balance and summary report prepared by this group was completed. Work on the May report was well along at the time of the May 29 inventory. Daily reports normally issued were withheld during the early part of the month, but are now being issued approximately on a current basis.

Laboratory Coordination Unit

The remaining analysis results for the month of April were collected and applied. Results available in May were collected. Laboratory coordination has been improved considerably by the recent revision of a priority system defining the order in which determinations are to be made.

Material Handling Unit

Receipts and shipments of normal, depleted, and prdduct materials were routine for the month. A 25% reduction in product shipments was affected by use of the second 8 cylinder truck. Special studies were begun to:

1. Determine the amount of corrosion in an iron one ton chlorine cylinder which was filled for about two years with TF_6.

2. Determine a gasket material with longer life for use on product cylinders. P-10 has been examined in preliminary studies.

3. Determine a method of reducing the dry ice used for shipments to Y-12. Preliminary indications are that this can be done by reducing the length of the product cylinder false bottom, which would require less ice to cover the cylinder.

G. T. E. Sheldon

R. W. Levin

RWL/ljh

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TABLE I

SOURCES OF UNCERTAINTY IN X-BALANCE
June 1, 1947

	Source		Measurement	Error	Current ± Limit of Error	Current Sampling Schedule	Annual Variance Kg^2 X Current	Annual Variance Kg^2 X Target
					40%		2500	22.4
Consumption								
Cascade Streams	T-Analysis	Laboratory Contribution	Feed	Precision	0.14%	1 S./6000lbs.TF_6	0.03	0.02
				Bias	0.03		0 50	2.15
			Waste	Precision	0.12	1 S./4500lbs.TF_6	0.01	0.01
				Bias	< 0.04		0.25	1.05
			Product	Precision	0.35	1 S./daily ship.	0.02	0.01
				Bias	< 0.90		< 25.00	0.15
		Sampling Contribution	Feed	Precision	< 0.13%	1 S./6000lbs.TF_6	0.03	0.02
			Waste	Precision	< 0.28	1 S./4500lbs.TF_6	0.03	0.01
			Product	Precision	1.00	1 S./daily ship.	0.15	0.01
	X-Assay	Laboratory Contribution	Feed	Bias	0.75%		25 00	1.10
			Waste/Feed	Precision	0.10	1 S./4500lbs.TF_6 for mo. comp.	0.24	0.06
				Bias	0.30		25.00	1.10
			Product	Precision	0.20	1 S./2 cyl.	0.00	0.60
				Bias	0.20		1.40	1.00
		Sampling Contribution	Waste	Precision	0.10%	1 S./4500lbs.TF_6	0.01	0 06
			Product	Precision	0.20	1 S./2 cyl.	0.00	0.00
	Weights		Feed	Precision	2lb./day		0.01	0.03
			Feed-Waste	Bias	1 lb/day		0.15	0.15
			Waste	Precision	2 lb/day		0.00	0.02
				Bias	2 lb/day		0.06	0.55
			Product	Precision	1 g/cyl.		0.00	0.00
				Bias	½ g/cyl.		0.30	0.30
Change of Cascade Inventory	Operational Factors		Size Factors	Bias	8%		0.16	0.06
			Control Valves	Precision	2.5units		0.06	0.06
			Heavy Contaminant	Precision	15%		0.06	0.06
			Light Contaminant	Precision	20%		0.35	0.06
			Datum Pressure	Precision	0.03psi.		9.00	0.25
			Stage Pressure	Precision	0.02psi.		0.04	0.04
			Temperature	Precision	3°F		0.00	0.05
			Assay	Precision	0.75%		0.20	0.20

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